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Animal Keepers' Forum

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American Association of Zoo Keepers, Inc.

The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

About the Cover

This month's cover photo comes to us from Mike Aguilera of SeaWorld® San Diego. Two Emperor Penguins (*Aptenodytes forsteri*) enjoy the morning snow fall at SeaWorld in San Diego (each day the keepers blow thousands of pounds of fresh snow into the penguins' habitat). These two relatively young birds are a female (on the left) and a male (on the right). SeaWorld has the only colony of emperor penguins in the Western Hemisphere outside the Antarctic. The emperor penguins share the simulated Antarctic habitat with macaroni, Adélie, gentoo and king penguins.

Most emperor penguin nesting colonies are located on winter sea ice formations. A 2014 paper, Projected continent-wide declines of the emperor penguin under climate change by Jenouvrier et al., prompted the IUCN to uplist emperor penguins to Near Threatened. A petition for the emperor penguin to be listed on the U.S. Endangered Species list is currently under review.

Articles sent to ***Animal Keepers' Forum*** will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for ***AKF***. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: aazk.org/akf-submission-guidelines/.

Deadline for each regular issue is the 3rd of the preceding month. Dedicated issues may have separate deadline dates and will be noted by the Editor.

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FROM THE PRESIDENT

Many of you may have talked with Robin Sutker from the Maryland Zoo in Baltimore, as Manager of our National Zoo Keeper Week Program, during a conference or through social media. Robin has been working hard to engage members and learn how The American Association of Zoo Keepers (AAZK) can help you with utilizing our Association's resources!

I am excited to announce we have formed a new committee called the AAZK Member Resource Committee (ARC) with Robin as the Chair and Rebecca Salinas from the Houston Zoo as Vice Chair.

The committee is being tasked with creating and developing resources for the membership, specifically targeting Chapter operations. ARC will provide resources for frequently asked questions, emerging topics and materials to convey information between the AAZK leadership and the membership. It will also help you find resources in an organized and centrally-located section of the Association Webpage.

ARC will provide members a platform for informational and Chapter product exchange at the National Conference or through other AAZK media. You may have come across the Chapter Marketplace at the last two conferences in the Exhibitor Hall, which will be a component of this platform.

AAZK's National Zoo Keeper Week Program (NZKW) will also continue as a component of ARC. This incredibly successful program will continue to promote the work of animal care professionals and zooquaria institutions to the general public throughout the year and highlight it with events during the third week of July to create public awareness of AAZK and animal care professionals dedicated to conservation and wildlife.

Speaking of incredibly successful programs, Bowling for Rhinos (BFR) continues to grow with the help of your passion and dedication! Carol McCallum from the Jenkinson's Aquarium has been appointed the BFR Program Manager and Kym Janke from the San Diego Zoo will be the BFR Program Vice-manager. With their team, they will provide the resources You need to have a successful BFR event this year!

Christy Mazrimas-Ott from the Brookfield Zoo is our Trees for You and Me (TFYM) Program Manager and has expanded her team to include an Event Coordinator, Communication Liaison, Grant Coordinator and a Conference Coordinator. This budding program is endowing a TFYM Grant aimed at providing funding for tree-planting in areas of the world that have been devastated by deforestation. You and your Chapter can participate by holding fundraising events to support tree plantings through the TFYM Grant. Planting trees is one of the tools we have to sequester carbon, reducing the build-up of carbon in the atmosphere and sea ice melting to preserve polar bear habitat.

So, engage with the new AAZK Resource Committee, with the conservation of rhinos by hosting or participating in a Bowling for Rhinos event and by fundraising for the Trees for You and Me Grant. These are all great ways to have fun engaging with your fellow AAZK Members.

I thank you for your membership,

Penny Jolly

AAZK Professional Development Committee
First Call for Papers and Posters

The 44th Annual AAZK National Conference
Washington, DC August 27-31, 2017.

Conference Theme: "Keepers United in Saving Species"
Hosted by National Capital AAZK and the Smithsonian's National Zoo

First Call for Papers and Posters

The AAZK Professional Development Committee is pleased to announce the first call for papers and posters for the 2017 National AAZK Conference hosted by National Capital AAZK. The Host Chapter has chosen the theme "Keepers United in Saving Species", which will highlight how zoo and aquarium professionals work together in protecting wildlife through various conservation efforts.

Deadline for Submission of Abstracts for Papers and Posters: 1 May 2017

Authors will be notified regarding acceptance by 1 June 2017.

There is a **NEW PROCEDURE** for submissions this year.

How to Submit Your Abstract for Consideration:

- Go to the 2017 conference website http://www.ncaazk.org/2017_conference/papers_posters_workshops/
- Download the Application for either poster or paper
- Fill out completely and submit to pdc@aazk.org no later than May 1st

NOTE: If you do not use the new application, your abstract will not be reviewed.

Papers

Papers should focus on the conference theme including innovative approaches and best practices in the areas of husbandry, animal welfare, conservation, education, enrichment and training.

Authors will be allowed 15 minutes for a presentation with five minutes of Q & A immediately following.

Posters

Posters will be on display throughout the conference with a scheduled Q & A session with the author; time to be determined. Posters will be judged by members of AAZK PDC on criteria such as adherence to the conference theme, innovation, and poster layout and organization. Certificates will be awarded to winning posters at the designated Poster Session.

COMING EVENTS

Post upcoming events here!
e-mail shane.good@aazk.org

April 5-7, 2017
Chimpanzee SSP Husbandry Workshop
Keithville, Louisiana
Hosted by Chimp Haven
For more information go to:
chimphaven.org/events/2017-chimpanzee-ssp/

April 17-20, 2017
African Painted Dog Conference
Topeka, KS
Hosted by Topeka Zoo
For more information go to:
http://topekazoo.org/APDconference/

April 17-22, 2017
AZA Best Practices in Animal Keeping Course
Buffalo, NY
Hosted by Buffalo Zoo
For more information go to:
aza.org

April 26, 2017
New York City AAZK Regional Symposium
Bronx, NY
Hosted by New York City AAZK Chapter and Bronx Zoo.
For more information go to:
http://nycaazk.blogspot.com/

April 23-28, 2017
ABMA Annual Conference
Cincinnati, OH
Hosted by Cincinnati Zoo and Botanical Garden.
For more information go to:
theabma.org/abma-annual-conference/

June 5-9, 2017
Practical Zoo Nutrition Management
Front Royal, VA
Hosted by the Smithsonian-Mason School of Conservation and the National Zoological Park
For more information go to:
http://smconservation.gmu.edu/programs/graduate-and-professional/professional-training-courses/nutrition/

July 12-22, 2017
International Herpetological Symposium
Rodeo, NM
Hosted by Chiricahua Desert Museum
For more information go to:
internationalherpetologicalsymposium.com/40th-annual-symposium/

July 31 - Aug 4, 2017
Elephants 360: Advancing Health and Wellness
Cleveland, OH
Hosted by Cleveland Metroparks Zoo
Registration info coming soon!

August 28-30, 2017
Old World Monkey Husbandry Workshop
Columbus, OH
Hosted by Columbus Zoo
For more information contact Audra Meinelt:
Audra.Meinelt@columbuszoo.org

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August 27-31, 2017
AAZK National Conference
Washington, D.C.

Hosted by the National Capital AAZK Chapter and Smithsonian's National Zoo

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September 9-13, 2017
AZA Annual Conference
Indianapolis, IN
Hosted by Indianapolis Zoo
For more information go to:
www.aza.org/conferences-meetings

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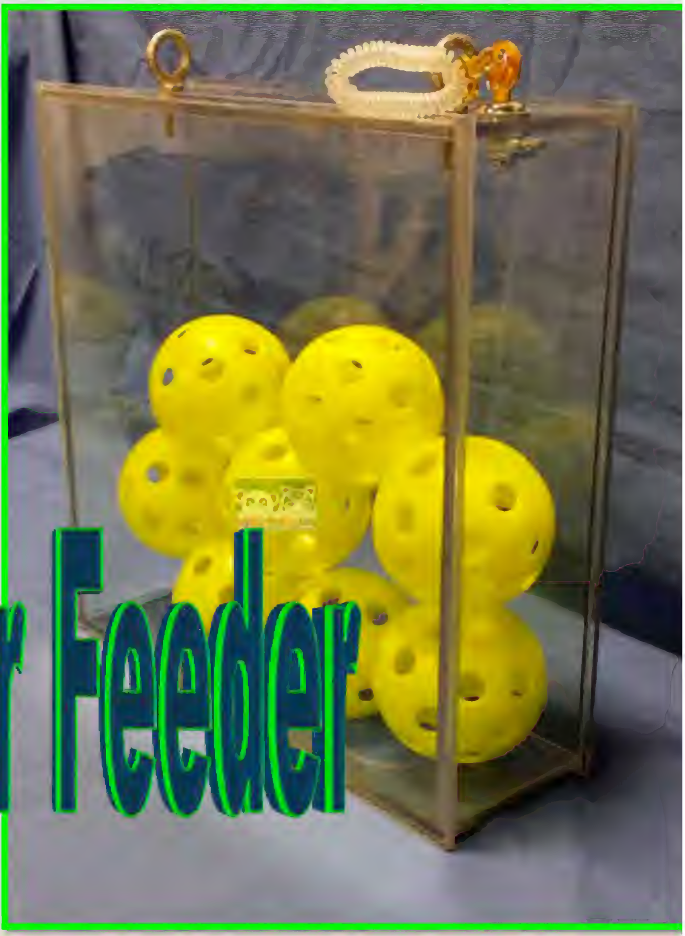

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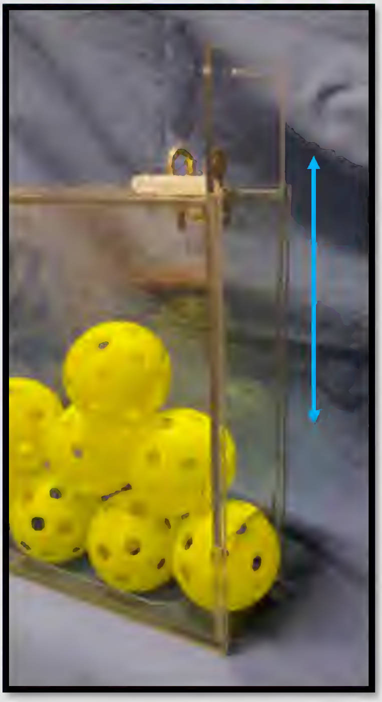

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Bowling for Rhinos Update!

Kate Clemens
Bowling For Rhinos Committee, Communication Liaison

AAZK's Bowling for Rhinos (BFR) has been one of the AAZK's trademark fundraisers for the past 27 years, raising over $6.2 million since 1990! This year, a BFR committee has been put into place. Patty Pearthree has retired from Program Manager but will still lend her expertise in the role of Trips Coordinator. The new committee as a whole is comprised of:

- Carol McCallum- BFR Manager
- Kym Janke- BFR Vice Manager
- Kevin Shelton- Conservation Coordinator
- Lisa Haggadone- Events Coordinator
- Kate Clemens- Communications Liaison
- Patty Pearthree- Trips Coordinator

If you have questions for the BFR Committee, please contact Carol McCallum at carol.mccallum@aazk.org or Kym Janke at kym.janke@aazk.org.

Speaking of Bowling for Rhinos, it's that time of year again! Time to start planning your Chapter's Bowling for Rhinos! Something to keep in mind is in order to have a BFR Event the event MUST be sanctioned. Sanctioning occurs by sending a $25 fee to National AAZK headquarters. All checks must be made payable to AAZK. Once your fee has been collected you will receive your BFR Kit.

Sanctioning fee can be sent to:
AAZK Office
8476 E Speedway Blvd. Suite 204
Tucson, AZ 85710

Is there a member of your Chapter who has gone above and beyond for Bowling for Rhinos? Consider nominating them for The Anna Merz Champion Award! The Anna Merz Champion (AMC) Award process has now been revised. The AMC Award commemorates the late Anna Merz, the Co-founder of Lewa and Rhino Champion. This award will be granted to a randomly selected nominee who has demonstrated passion and dedication to AAZK's Bowling for Rhinos. To qualify the nominee must be an AAZK member in good standing who has been involved with sanctioned BFR events for at least three years. The nominee may not be a previous recipient of the AMC award or have been awarded a previous BFR or IRF trip as one of the highest fund raisers. Committee Chair or Vice Chair, Program Manager or Vice Manager, or members of the AAZK Conservation Committee or a current member of the AAZK Board of Directors CANNOT be nominated. Nominations are open from January 1st to August 1st. To send in nominations or for questions, please contact conservation@aazk.org.

Let's break another record this year and work together to continue to save the rhinos!

Trees for You and Me '16-'17

Christy Mazrimas-Ott,
Trees for You and Me Program
Manager and Senior Keeper
Brookfield Zoo/Chicago Zoological
Society, Brookfield, IL

The totals for the 2016 Trees for You and Me (TFYM) Program are finally in; 15 AAZK Chapters and Crowdrise funds raised $13,837.91. A big thank you goes out to the Birmingham Zoo Chapter of AAZK, New York City Chapter of AAZK, Greater Orlando AAZK Chapter, San Antonio AAZK Chapter, Rocky Mountain AAZK Chapter, Milwaukee County AAZK Chapter, Brookfield AAZK Chapter, ABQ AAZK Chapter, Portland AAZK Chapter, Greater Philadelphia AAZK Chapter, Lincoln Park AAZK Chapter, Heart of Illinois AAZK Chapter, Columbus AAZK Chapter, Akron Zoo AAZK Chapter, and the St. Louis AAZK Chapter for participating in the 2016 TFYM program. Congratulations to the Columbus AAZK Chapter raising the most funds this year, $3,410, which Polar Bears International matched with $500. The TFYM grand total of $14,337.91 was awarded to two TFYM grant applicants.

The Trees for You and Me Committee would like to congratulate our two recipients of the 2016 Trees for You and Me Grant: Cheryl Peterson from Lake Louisa State Park received $12,668.96 for her project titled "Restoration of critical Sandhill Crane habitat with Lake Louisa State Park with the planting of Longleaf Oak, Turkey Oak and an experimental introduction of the federally listed Clasping Warea (*Warea amplexifolia*). Lauren Starkey from the Akron Zoo received $1,668.96 for her project called "Cans for Corridors".

The Trees for You and Me 2017 campaign is up and running. A Treeblitz **https://www.crowdrise.com/trees-for-you-and-me1/fundraiser/mary-anncisneros** is currently going on through 1 April 2017 to raise funds to help promote the Trees for You and Me grant. National AAZK will be selling a TFYM shirt this year for the first time too, as another fun way to support polar bears and raise money for TFYM. This year Trees for You and Me brochures are now available! If your Chapter is interested in receiving them, please contact Ed Hansen at **ed.hansen@aazk.org** Quantities up to 25 are available to be ordered! The TFYM grant applications are due by 1 May 2017 and the TFYM program runs through 1 November 2017. If interested in learning more about Trees for You and Me or applying for the Trees for You and Me grant go to **https://www.aazk.org/committee/trees-for-you-and-me/**

The Trees for You and Me Committee has a few new members who will be more involved with the program. Christy Mazrimas-Ott (Brookfield Zoo) is the program manager, **christy.mazrimas-ott@aazk.org** and Anthony Nielsen (Lincoln Park Zoo) the co-manager, **anthony.nielsen@aazk.org**. The TFYM Committee point persons are: Krista Hyme (Columbus Zoo and Aquarium) Event Coordinator, Tanya White (The Maryland Zoo) Communication Liaison, Hardy Kerns (Columbus Zoo and Aquarium) Grant Coordinator and Nicole Pepo (The North Carolina Zoological Park) Conference Coordinator. MaryAnn Cisneros (Disney's Animal Kingdom) **maryann.cisneros@aazk.org** is the AAZK Board of Director that oversees the TFYM program. If any AAZK Chapters have questions about the TFYM program or grant please contact us.

AAZK Announces New Conservation Partner

Elephants *for* Africa

Conservation through research and education

Elephants for Africa is a charity that is committed to protecting the endangered African elephant through research and education.

Working towards human-wildlife coexistence, we conduct research to understand the ecological and social requirements of male African elephants, and put these in the context of human conflict. Working in Botswana with local international researchers to deliver scientific data to local decision-makers, we also run education programs focused on developing the conservation leaders of the future and empowering local communities.

The Problem

We are losing African elephants at an alarming rate. Less than 500,000 remain in the wild and 70% of these utilise areas outside of protected areas.

The Cause

Elephants are running out of time and space. Poachers are killing them illegally for their ivory, and, as human territory enlarges, it brings them into conflict with wild elephants. Sadly the space they have left to live in is diminishing.

The Solution

We study the daily needs of elephants and humans and seek local solutions to local problems. Elephants for Africa strives to protect, conserve and educate to ensure a future for wild populations of African elephant to move towards humans and wildlife coexisting.

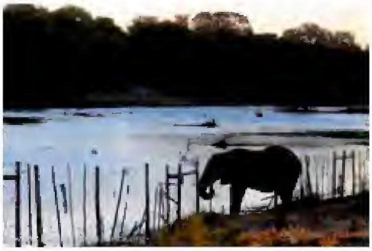
We aim to:

- Increase knowledge and understanding of male elephants, the main instigators of conflict with local communities
- To increase tolerance for wildlife, in particular elephants
- To empower and inspire the conservation leaders of the future

In 2016 we launched our Community Coexistence Project which has been funded for 3-years by the GoodPlanet Foundation. This is based on the foundation of our work in this area, and building a strong relationship with the community of Khumaga. Partnering with this community we are improving their understanding of male elephant behaviour and increasing the uptake of mitigation techniques to protect crops in the village. Alongside this programme our education programme has expanded to include the primary school in the remote village of Phuduhudu. Partnering with their Environmental Club we provide monthly activities, which focus on hands on learning experiences and opportunities to meet local role models to broaden their horizons for new opportunities and future careers.

Chilli Workshop: Community farmers learning how to use chilli for mitigation.

Primary school pupil on a visit to the National Park, part of our environmental education programme.



The Makgadikgadi National Park fence and an elephant drinking through it

Elephants for Africa is a UK-registered charity in England & Wales, (1122027)
& a registered NGO in Botswana (Number CR12058)
dedicated to elephant conservation through research & education.
Trustees: B Courtenay, J Graham & D Matthias

Using Breeding Behavior and Non-invasive Fecal Hormone Analysis to Establish Pregnancy in Captive Southern Three-Banded Armadillos (*Tolypeutes matacus*)

Rachael Dwyer, Keeper
Saint Louis Zoo
St. Louis, MO

The female armadillo and her 28-day-old pup.
Photo by Rachael Dwyer, Saint Louis Zoo

Abstract

A southern three-banded armadillo breeding pair's activity was recorded via digital camera 24 hours a day for 21 days. After reviewing the footage, the activity level and social interaction of the pair was documented. Before breeding occurred, the activity levels of both armadillos were high with a lot of overlapping active periods, in which numerous chasing events occurred, eventually followed by mounting. After breeding occurred, activity levels lowered with long resting periods spent lying under the tub in their enclosure. Twenty-four mounting events were recorded during the duration of the 21 days. Twenty-two of these events were recorded in a 10-hour period, visibly demonstrating reproductive behavior. Before the armadillos were introduced, fecal samples were collected from the female which allowed for a baseline of progestagen levels to be established. After breeding, additional fecal samples were collected from the female. The progestagen levels in these samples were compared to the baseline levels, and these data were used to determine that the female was pregnant.

Introduction

Little is known about the breeding behavior of captive-housed three-banded armadillos, primarily behavior before and after mating, interaction during mating, length of copulation, and overall activity level. Periods of activity and rest were noted, in addition to successful mounts. Chasing events have been reported in the six-banded armadillo *Euphractus sexcinctus* (Porfirio et al., 2015), and a similar study verifies a comparable chasing behavior in the Brazilian three-banded armadillo *Tolypeutes tricinctus* (Tomas et al., 2013). A better understanding of these behaviors will benefit future attempts to breed three-banded armadillos in captivity.

Data

A captive-housed male armadillo was introduced to a captive-housed female armadillo for a total of 21 days. The pair remained in a 141" x 56" enclosure with roughly a 2" layer of straw substrate and a large inverted tub was provided as a shelter. The introduction occurred at

1000 hours on 19 June 2015. The armadillos were recorded using a digital video camera that captured the entire enclosure. The camera recorded 24 hours a day. The footage was then reviewed on a computer and occurrences of behavior were recorded from this footage. From the time of the introduction to 0820 hours the next day, both armadillos demonstrated extremely high activity levels with very little rest periods. In this study, the term active is defined as any state of movement, e.g., walking, eating, chasing, mounting. Additionally, the term rest is defined as a state of inactivity, e.g., sleeping. During the study, both the female and male had a total of about 182 hours of overlapping active behavior. For the majority of this overlapping behavior, the male was observed chasing the female; therefore, the armadillos were always in close proximity of each other. The male spent approximately 46 hours in an active state, while the female was in a resting state. Additionally, the female spent about 29 hours in an active state, while the male was in a resting state. Behaviors observed when the armadillos were active alone include walking around the enclosure, eating, and drinking.

The armadillos were in an overlapping resting state for roughly 233 hours of the study, always resting next to each other under the shelter they were provided in their enclosure. On three separate occasions, the male armadillo was found resting in the corner of the enclosure, and only during one of these instances was the female lying next to him. The male spent approximately 29 hours in a resting state, while the female was in an active state. Additionally, the female spent approximately 46 hours in a resting state, while the male was in an active state.

Most breeding attempts made by the male were unsuccessful. The female seldom stood for mounts, occasionally chased him away, or rolled onto her side when approached. Many times when he approached her, they would roll over with their ventral sides facing each other and legs kicking. This behavior continued only for a few seconds before they would get back up. It is not known what this behavior signifies. The first successful mount observed on video occurred on 24 June 2015 at 0800 hours, and lasted for 25 seconds. On 28 June 2015, another mount was recorded at 0710 hours, and lasted for a total of six seconds. On 29 June 2015, 10 days after the introduction, there were 22 total mounts in a 10-hour period, with the mounts lasting from 10 seconds to 13 minutes. During this 10-hour period, the first 11 mounts occurred between 2400 and 0147 hours. The time between mounts varied one minute to 33 minutes. Then the armadillos rested for eight hours. From 0950 hours to 1026, 11 more mounts occurred. The time between mounts varied from one minute to 16 minutes. During a mount, the male approached the female from behind and lifted his forelegs onto the female's back. They would then walk in unison together which suggested copulation; however, it was difficult to determine exactly when complete copulation occurred. This mounting behavior has been observed in other three-banded armadillo studies (Smith, 2007).

The female's enclosure where the introduction occurred.
Photo by Rachael Dwyer, Saint Louis Zoo

Fecal samples were collected from the female three times a week for the 12 weeks preceding the male introduction and again after mounting was observed. These samples were extracted using a previously published protocol (Dumonceaux et al., 2006). Briefly, approximately 0.5g of wet fecal material was weighed then shaken overnight in 5 ml of a modified phosphate-saline buffer containing 50% methanol. Liquid extracts were decanted and solids were removed through centrifugation at 4000 g.

Figure 1. Shows the established fecal progestagen levels for female southern three-banded armadillos with two rises above baseline

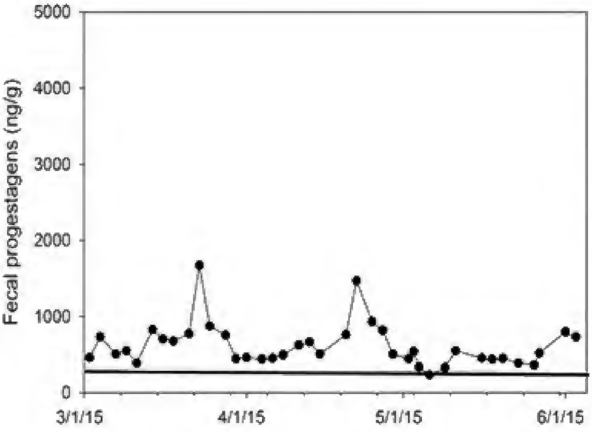
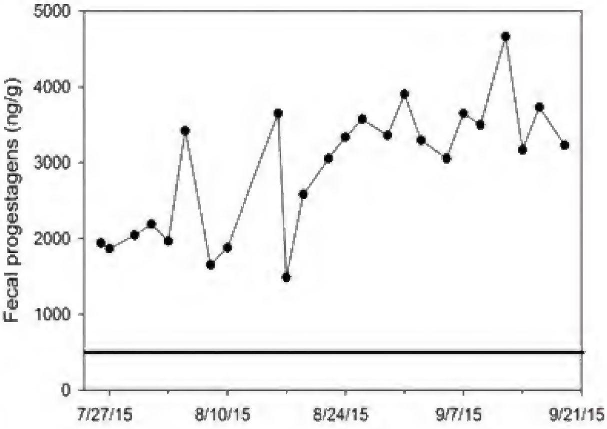


Figure 2. After mounting behavior is observed, luteal phase values rise above the baseline indicating that the female armadillo is likely pregnant



Supernatants were then frozen at -80 °C until assay. Fecal material was placed in a drying oven overnight at 100°C. Fecal progestagens were measured using a commercially-available EIA kit (DetectX® Progesterone EIA K025, Arbor Assays). The assay has a lower detection limit of 50 pg/ml and the upper detection limit was 3200 pg/ml. Samples were diluted 1:100 with assay buffer, and assays were run according to kit directions. All samples were assayed in duplicate. Hormone concentrations were determined as ng/ml, and then divided by the dry weight of the extracted feces to give the results as ng/g feces. Mean intra-assay variation of duplicate samples was 8.7%; mean inter-assay variation was 9.5%.

Samples collected prior to breeding were used to measure progestagen levels in the female and a baseline was established. After the 12 weeks, she showed two rises above baseline in approximately 30 day intervals, which is about the normal cycle length for armadillos (Howell-Stephens et al., 2013.) The data concluded that the baseline levels for armadillos are about 400 ng/g whereas luteal phase values are between 800 ng/g and 1600 ng/g (Fig. 1). After determining these reference values, additional fecal samples were collected from the female after breeding was observed. These samples were collected three times a week for eight weeks. At the end of this period, all of the values were above the baseline level established by the previous batch of samples (Fig. 2). Since these values were in the mid-thousands, and were maintained for the entire eight weeks-(twice the length of a normal cycle), it was concluded that the female was very likely pregnant. On 16 October 2015, an armadillo pup was born, exactly 120 days after the introduction; thus supporting reports that births take place October to January (Smith, 2007) and confirming previous reported gestation length (Benirschke, 2010). Other reports indicate births throughout the year, signifying that there is no specific breeding season (Ellis, 1999).

Discussion

Before breeding, both armadillos demonstrated high activity levels during the night with few rest periods. Some of these high activity periods lasted up to 14 hours with no rest. They were active on and off during the day. Throughout the study, mounting only occurred between 2400 and 1030, suggesting that the morning hours are the preferred breeding time. After breeding, both armadillos were active on and off during the day, but rested most of the night under their tub. Out of the total 181 hours of overlapping active time, roughly 132 hours of this time occurred before breeding; therefore concluding that overlapping activity levels decreased after the last mount was recorded. Additionally, the female's activity level was highest before she bred, while the male was more active after breeding. For the majority of the 21 days, the armadillos rested under their tub in proximity of one another. During their active periods, the male spent most of the time chasing the female followed by mount attempts. This supports that chasing behavior is a pre-mating behavior. For the first 11 mounts during the 10-hour breeding period, the time between mounts varied slightly. On average, the time between mounts was 7.4 minutes while the length of each mount averaged 2.5 minutes. After about an eight-hour resting period, the 11 additional mounts occurred. The time between these mounts averaged about three minutes while the length of each mount averaged 37 seconds. Since the length of each mount differed, it is difficult to determine when copulation actually occurred, in addition to the average duration of a mount followed by copulation. Ultimately, the observed behaviors in this study are an indication that successful breeding occurred, and this research further shows that cycling and pregnancy in armadillos can be monitored through non-invasive fecal hormone analysis.

Acknowledgements

I would like to thank C. Kozlowski for fecal sample analysis, data interpretation, and advice.

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Volunteering with Action for Cheetahs in Kenya

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As someone who loves wildlife, I would be thrilled to work with most any animal, however, there is a special satisfaction in the opportunity to care for animals living in threatened areas or those whose declining populations need a voice. I work in the Smithsonian National Zoo's Cheetah Conservation Station caring for cheetahs and a variety of other threatened African animals including: Addra gazelles, scimitar-horned oryx, Grevy's zebras, and Ruppell's griffon vultures. These animals, like so many others in Africa, and across the globe, are facing altered ecosystems and decimated habitats as a result of the growing and spreading human population. Constant population growth leads to inevitable encroachment on wild habitats, often resulting in human-wildlife conflict. For many regions, the future of conservation lies not only in preserving natural spaces and individual species, but also cultivating a rewarding relationship between the people and the animals sharing land and resources.

A few years ago, I began looking for volunteer opportunities with different conservation groups in hopes of doing more for cheetahs in the wild. I'm fortunate to have one-on-one interactions with cheetahs every day in Washington, DC, so I was looking for a program where I could do field work that would benefit the species as a whole. Seeing or interacting with cheetahs was not my focus. Because conservation efforts need to balance the wants and needs of humans and the wildlife in an environment, I was careful to look for an organization that had a community-based approach to conservation and had a history of successful work in a variety of areas. In 2014 I decided to begin work with Action for Cheetahs in Kenya (ACK).

ACK was founded by Mary Wykstra and Dr. Laurie Marker in 2001 under the Cheetah Conservation Fund of Namibia and officially became its own organization in 2009. ACK is an annual beneficiary of AAZK's Bowling for Rhino's fund raiser. Director, Mary Wykstra, employs an entire staff consisting of members of the local Kenyan community. ACK takes a holistic approach to saving cheetahs by focusing not only on preserving the cheetahs, but their habitat, prey base, other large predators, as well as fostering relationships with Kenyan people living with the wildlife.

In Kenya, urban sprawl and livestock ranching cause competition for food and water resources, not only between wild and domestic animals, but also between humans and wild animals. When previously commercial ranchland is further subdivided, resources are often not used sustainably. Fences add additional complications for wildlife by preventing natural movement and blocking migratory pathways, causing wildlife populations to become isolated. In species like cheetahs, where wild populations are already low in genetic diversity, lack of connectivity between populations puts added pressure on future genetic health and the overall species' survival.

Current estimates suggest there may be as few as 7,000 cheetahs left in the wild. Kenya holds the second largest population of cheetahs in the world and keeping the population within Kenya connected is essential to the future success of the species. Cheetahs survive in a wide range of habitats, temperatures, and land types with vast home ranges. Especially if they have cubs, cheetahs tend to avoid areas with high densities of larger predators often resulting in distribution outside of protected areas. Conservation efforts must exist outside of parks or fenced areas, thus requiring large scale, collaborative efforts, including support from private land owners.

While in Kenya, I had the opportunity to support several ACK projects. I assisted University of Nairobi student, Noreen Mutoro, with field work for her masters thesis. We collected cheetah fecal samples to be analyzed

Noreen and Mary. *Photo by Regina Bakely*

Regina and Pius. *Photo by Mary Wykstra*

for prey hair identification to see what the cheetahs in this region are hunting. I participated in day and nighttime game counts to ascertain the availability of prey as well as the presence of other predators in the chosen study sights. Bumping along in the back of a truck counting antelope through binoculars while the sun comes up over Kenya is as amazing as it sounds.

While the animal experiences were predictably a high point, I was surprised how impactful it was to talk with local farmers. As part of the preparations for a study to determine the effectiveness of predator light deterrent systems, Mary sent me with one of ACK's community field officers, Pius Wamunyu, to talk with people in the community about wildlife conflict and how they dealt with it. I did not anticipate the influence that experience would have on my future outlook on community conservation work. One couple we visited had a goat injured by predators the previous night. They were gracious and welcoming, offering us water and a place to sit out of the sun. They spoke about wanting their children to see the wildlife of Kenya in the future but were frustrated with what they could do presently. They had issues with crops being eaten when they left their field unattended to walk to the closest water source (not close by American standards).

Pius and I walked down to the crops to take some measurements and decide where to place camera traps to assess crop raiding before and after the installment of the light deterrent system. The crops in the field were not doing well and I felt like an elephant as I tried to avoid damaging anything. We heard raucous movement in the brush along the perimeter and everyone began scouring the ground for rocks. Pius told me that baboons were in the bushes and they were trying to scare them away by making noise. In that moment it became clear that this was not a situation of bad people and good animals. Just like I don't want to see cheetahs shot for taking a goat, I don't want to see a family's existence wiped out in front of my eyes by baboons.

Many of the talks and conversations I had previously participated in at work really focused on blaming people. While it's fair to say, much of what is happening to the environment is our fault, that's not a productive stance to maintain and it certainly doesn't provide the resources to promote change. The family terrorized by baboons, like many others, did not want to kill animals. They are people who were understandably prioritizing the basic needs and safety of their families. When those needs are met and people have the resources and understanding to keep themselves safe, they can then care about the needs and the safety of the wildlife.

On the morning I was to leave Mary's house in Nairobi, I sat on the porch pouting. I wasn't ready to go. I'd booked a safari to see more of Kenya and Tanzania after the conclusion of my work with ACK. It was something I'd always wanted to do and instead of being excited, I dreaded leaving. My guides arrived in their big luxurious safari truck and stood in Mary's driveway discussing the need for rounding up animals to put them behind fences in parks. My pouting turned quickly into sobbing. I saw these people with ideas different than my own, again, as the enemy. Mary saw only opportunity. She moseyed into the driveway and in ten minutes of friendly persuasive talk, she had these men laughing and agreeing that keeping wildlife wild and free was what needed to happen. I was amazed and I felt silly. Mary collected me up, told me I'd be back, and sent me away realizing that part of the responsibility of being someone who sees the importance of what we do, is guiding others to that realization as well. Her unyielding personal drive to make a difference in the world and her ability to motivate other people to make a difference continues to inspire me.

This February, as Mary predicted, I will return to Kenya, with support from Friends of the National Zoo, to be part of a Kenya-wide cheetah population count ACK is conducting in collaboration with the Kenya Wildlife Services. It is a noninvasive study that includes collecting scat samples with the help of ACK's new cheetah feces detection dog. Samples will be studied for prey hair again as well as genetic analysis on the diversity of the Kenyan population. They will be analyzed to determine stress hormone levels under different land use conditions. Genetic information will be gathered from the samples in hopes of having reference for future work in determining the origin of confiscated cheetah cubs in the pet trade. This information will all be used in consideration of future conservation strategies in Kenya.

I've learned to see conservation as cooperation, not battle. Because zoos are in a unique position to reach large audiences of people with many points of view, I try to remember that when talking to visitors. I came home far more conscious of the unrealistic expectations often placed on indigenous people living among wildlife. Despite the imaginary lines we draw all over the map and the five different names we give one ocean, we all live in one place. One interconnected system of environments that impact one another. All of our choices matter and each one of us can do better. No matter what region you are drawn to or taxa you're passionate about, if you can, go do something. You may find, as I did, the value of the volunteer work is about the aid you provide while you're there but even more about the message you bring back.

ACK offers individual opportunities for volunteers and an annual group trip that includes research and safari opportunities. Contact ACK through www.actionforcheetahs.org.

Using Enrichment to Create an Interactive African Penguin Encounter

Stacy Johnson, Bird Keeper
Denver Zoo, Denver, CO

INTRODUCTION

Denver Zoo has been offering informal penguin tours with one of our African penguins, *Spheniscus demersus*, named Maddy for several years. In 2013, Animal Adventures: Penguin Encounters began as an official paid tour offered to our guests. This guided tour provides a behind-the-scenes look at Bird World (an indoor facility for several bird species) and ends with an African penguin encounter.

Maddy (7-years-old) had to be hand-raised by keepers when it was discovered her parents were not feeding her appropriately. Because of this, Maddy was already imprinted on humans so she transitioned easily when meeting new people during informal encounters. Following the Species Survival Plan (SSP) breeding recommendation, Maddy was paired with her recommended breeding mate. While Maddy focused on this pair bonding, we knew we were going to be in need of another ambassador penguin to continue educating our guests about these endangered birds for our encounter program.

Juniper hatched May 9, 2013 and was returned to her parents for parent-rearing until 30 days of age, at which point she was hand-raised by a few keepers. Our goal was to desensitize her to being handled and being around new people in preparation for the Animal Encounter Program. Unfortunately, Juniper contracted avian malaria at around 55-days-old and had to be nursed back to health. This meant all interactions had to cease until she made a full recovery. The healing process took over three months, and as a result, Juniper had a major setback with being around people she did not know. We knew immediately we were going to have to try different techniques in order to get Juniper comfortable with the Animal Encounters and being around strangers.

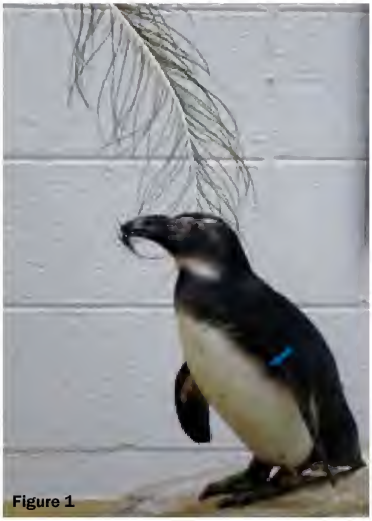
THE PENGUIN ENCOUNTER PROGRAM

The program was originally designed to provide guests with knowledge of African penguins, both in the wild and in zoos. Guests were allowed to sit on the floor and a keeper would bring in Maddy for an encounter. Maddy is extremely friendly with anyone and as she made her pass around the room, guests would be able to touch her. At the same time, keepers educate the guests on the Denver Zoo penguin flock, the husbandry of penguins, and also the problems African penguins face in the wild.

Once Juniper had recovered, we started bringing her in the encounter room with Maddy to get acquainted with the room since we knew we were planning on temporarily pulling Maddy out of the program for several months in order to pair her with her SSP selected mate. As soon as Juniper was comfortable entering the room voluntarily, we slowly started adding several keepers that Juniper was not used to seeing on a daily basis to begin acclimating her to the program. Juniper was very nervous around strangers, sticking close to the keepers that raised her. We asked Denver Zoo staff to begin volunteering their time with Juniper so that she could be exposed to all types of clothing and accessories. She also needed to be calm around all ages and large groups of people, so we also asked that staff bring in their families with kids 6-12-years-old. It took several months of introducing Juniper to other bird keepers, and other Denver Zoo staff, before she was comfortable moving around the room and interacting with other people on her own without being guided by her familiar keepers.

Once she was comfortable with zoo staff, we started having her do tours on her own, when she was approximately 9-months-old. We realized as a juvenile, she was extremely curious about everything, including jewelry, clothes, fast hand movements, etc. and she began nipping at all these new and exciting items. She was also scared of younger children, mostly due to their faster movements. We didn't want her to become aggressive as a result. We would need a routine that would work for Juniper, while also still being a great interactive and educational program for our zoo guests.

In the encounter room we asked the guests to sit on cube shaped seats during the interaction instead of on the floor to reduce the chances of Juniper biting someone. This quickly caused Juniper to lose interest in visiting with our guests and she would just stand in the corner. Keepers tried moving around the room to encourage her to interact, but she would just remain close to the keepers. When a guest moved their hands to touch her as she came near, she would be attracted to the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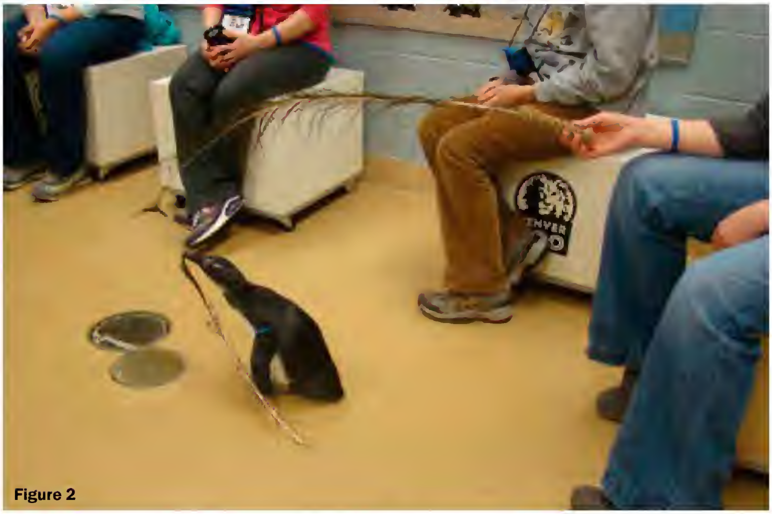
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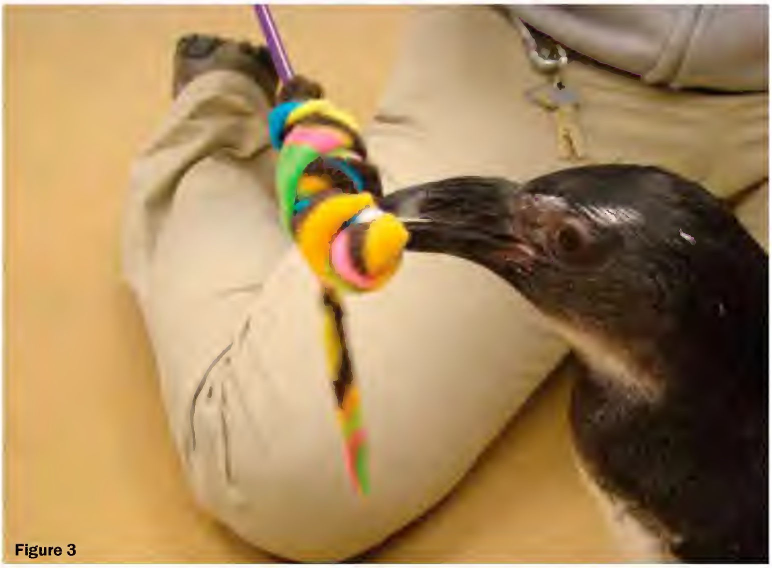
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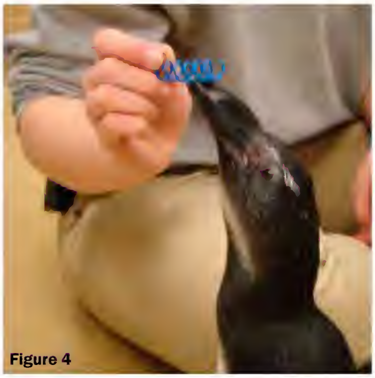
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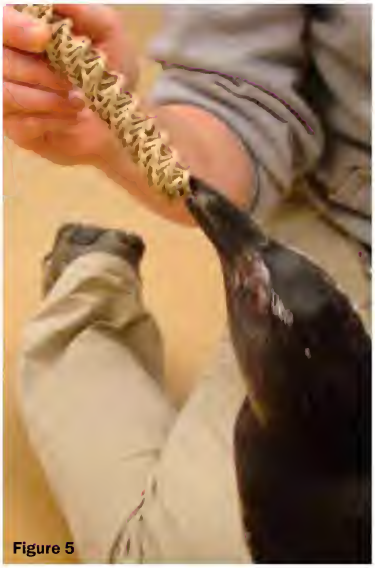
Figure 5

Figure 1. Juniper using peacock feather.
Figure 2. Guests using peacock feather during an encounter.
Figure 3. Juniper using felt string.
Figure 4. Juniper using plastic spring.
Figure 5. Juniper using sisal tube.

Enrichment has allowed our guests to have a special connection with these amazing birds.

movement and would try to bite them. As a result, we began asking people not to touch her so our guests would not get hurt. After many discussions on how to curb this potentially aggressive behavior, enrichment was a tactic we thought might keep her focused on an item instead of people's movements.

THE ENRICHMENT

Our penguin flock enjoys various types of enrichment, such as boomer balls, ice blocks, sprinklers, and bubbles. We were hopeful enrichment would lengthen Juniper's attention span and increase her interactions with guests. We wanted items that would be fun for the guests, safe for all of the encounter penguins and also create a distance between the guests and their beaks.

The first enrichment item we tried with Juniper was a peacock feather (Fig. 1). This immediately grabbed her attention. The feather is passed around from guest to guest encouraging Juniper to chase it around the room and interact with each guest (Fig. 2). She will often chase it, go back to her keepers, and then run back over to the feather.

Other enrichment items used are felt string (Fig. 3), small plastic springs (Fig. 4), sisal tubing (Fig. 5), wiffle balls, and tin foil balls. So far, peacock feathers seem to hold Juniper's attention the most. She now waits underneath the enrichment shelf in the encounter room, expecting her enrichment any time she is in that room, whether with paid guests or with her keepers.

Recently we started working with two new juveniles, Ramon and Rylie, to begin rotating with Maddy and Juniper for the encounters. Using enrichment for these new juveniles was also a huge success in getting them comfortable with the room and with people. They were so relaxed in the room that at 3-months-old, they were ready to be involved in the tours and now find the people way more interesting to be near than their enrichment!

The penguins' interactions with the enrichment items illustrate their natural behaviors, while we educate our guests. We are able to discuss their keen vision and attraction to movement, and how they use these senses for hunting fish in the wild. Guests can also discover how inquisitive they are and how this curiosity could cause problems for these birds in the wild.

OTHER BENEFITS OF THE ENRICHMENT PROGRAM

Keepers have been working with the African penguin flock on voluntary scale training. The flock has two scheduled feedings that are viewable to guests at the zoo. Due to these feeding demonstrations, using food as a reward for our flock is not an option during training sessions. Instead, keepers use enrichment as the reward for participating.

Denver Zoo currently houses 24 African penguins. From that group, only six have not participated in the training. Those six are the main breeding adults who do not appear to have any interest in getting on the scale. The scale does have to be placed in a "neutral zone" that is not too close to any particular pairing's kennel or less dominant birds will not participate. Also, not every bird participates in every training session, but of the participating birds, weights can be obtained about once a month.

Different types of enrichment are used for the training than in the encounter room. During scale training, the penguins can choose an acrylic target stick (which they actually prefer the handle portion) or a small plastic wand. There are other varieties of enrichment offered to them while on exhibit and also while in holding. We withhold the special enrichment both for training and the encounter room.

CONCLUSION

From the start of this program, it has been very important that we keep the encounter penguins fully integrated with the flock. When the birds are not participating in tours, they reside with the rest of the African penguin flock. We want to ensure SSP recommended breeding continues to take place and to not put additional stress on a molting penguin, therefore if a bird is nest building, incubating eggs, prepping for molt or in molt, they do not participate in the program.

We have gone through many trials with Juniper, and the other encounter birds, to create a fun and interactive program, not only for our guests, but also one in which the birds want to voluntarily participate in. It has taken a lot of time and effort, but the result has been wonderful. We have seen the birds' confidence in entering a room full of strangers increase tremendously, especially for Juniper.

Staff and guests have given us positive feedback of how excited they were to participate in the program, even if they couldn't touch a penguin. Enrichment has allowed our guests to have a special connection with these amazing birds. Excited guests can take their experience in a zoo setting to make changes in the wild that is critical to the conservation of African penguins and other animals around the world.

ACKNOWLEDGEMENTS

The managers in the bird department have been great in helping us problem solve and achieve our goals. Several other keepers and staff members of Denver Zoo have also graciously volunteered their time to help Juniper and our newest youngsters, Ramon and Rylie, to become acquainted with strangers. And a big thank you to Travis Garrett (penguin keeper) for all his help, support and ideas! I have been so thankful to be a part of this program. All of the birds involved inspire me every day.

Note: A portion of this paper was presented at AZA Mid-year Conference, Penguin Workshop, Columbia, South Carolina, March 2015
Previously published: The Penguin TAG Newsletter, Vol. 19; No. 2, October 2015

EO COMMENTS BY DAWN NEPTUNE

I think we can sometimes forget the important and diverse role enrichment can play in overall behavioral management and training in particular. This author demonstrates that effective enrichment can serve so many beneficial purposes, ranging from creative reinforcement to exciting ways to engage both animals and guests in learning. This program really highlights much of what I love about enrichment. Enrichment can elicit exploratory play, encourage behavioral development, promote coping skills and lessen overall stress. Animals can gain resourcefulness, flexibility, confidence and versatility through controlled exposure to novel experiences. It can serve as the perfect desensitization tool. In addition, I have always felt that there is no better way to capture a guest's attention and inspire them to learn more about conservation than by seeing an animal showcasing their intrinsic value and self-will through enrichment. Lastly, I was so impressed by the well-articulated balance of promoting the use of program animals that are still fully integrated with their social group, ensuring breeding recommendations, individual animal welfare AND fun, interactive guest encounters! Well done Denver - what a motivating example to follow. Thanks for sharing!

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Marcelo Jorge,
African Savanna Mammal Keeper
Fort Worth Zoo,
Fort Worth, Texas

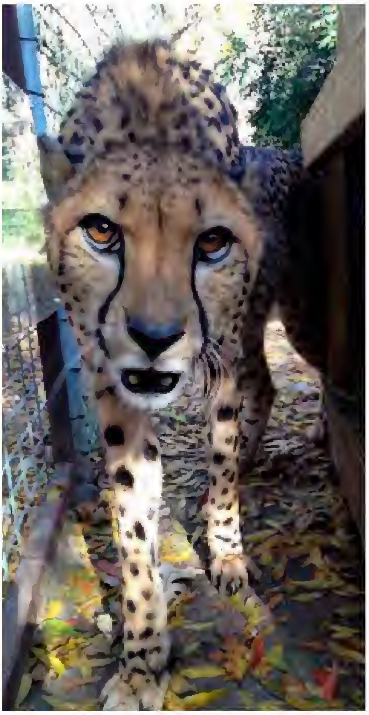

Figure 1. Cheetah Charo walking into position for a training session. *Photo by Marcelo Jorge*

Introduction

Blood draw training has become an integral part of zoological husbandry and has been documented with various carnivore species including lions (*Panthera leo*) (Shepard, 2011), tigers (*Panthera tigris*) (Miller, 2010; Miller, 2012), bears (*Ursus americanus*) (Flew, 2010; Pratte, 2010) and hyenas (*Crocuta crocuta*) (Morrell, 2011), but not specifically for cheetahs (*Acinonyx jubatus*). The Fort Worth Zoo received Charo, a female cheetah in April 2014, increasing our cheetah population from 2.1 to 2.2. Charo had no previous training experience but was highly food-motivated. We wanted to train her for medical procedures that could assist us in the event that she was receptive to one of our two male cheetahs and became pregnant. Radiographs could be used to confirm pregnancy and proper development of the fetus and can also provide general health information such as GI information, foreign body detection and if necessary, highlight bone fractures. Voluntary blood samples could provide reproductive information such as detection of estrus and signs of pregnancy. The ability to collect regular blood samples can also assist with monitoring general health factors such as immune response, illness detection, and response to treatments. This training can aid in the administration of treatments intravenously, anesthesia, monitoring of liver and kidney functions, and early detection of kidney disease. Additionally, this training could potentially provide data for clinical research focused on better understanding of cheetah biology and feline disease. This paper outlines how we trained a cheetah for voluntary radiographs and then used that training to facilitate voluntary blood draw training (Figure 1).

Methods

Once we outlined our goals and the benefits of the cheetah training program we began to work on planning the procedures and how to attain our first goal of taking radiographs of the cheetah's abdomen. Due to our setup we had access to only one side of the cheetah so we trained for lateral radiographs. Training began on October 11, 2015. All of the cheetahs are housed individually at night; during the day the males go on exhibit together while the females are in individual off-exhibit yards. Training with Charo was usually conducted in the afternoons but on a few occasions it was done in the morning. Training occurred 5-7 days a week either by one trainer or two, depending on the training step and availability of the trainers. In the beginning, training sessions lasted approximately five minutes but with continued training we could keep her involved and focused for up to 20 minutes. All of her reinforcement came from her daily diet, with the addition of "blood pops" made from blood collected from her daily diet and frozen

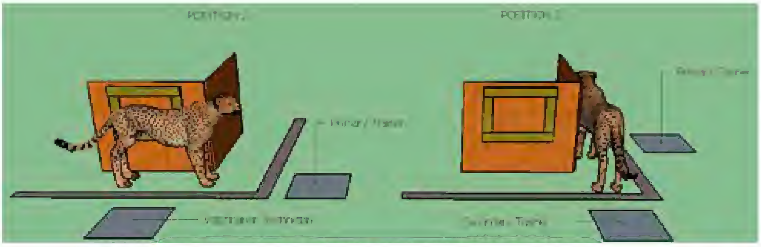

Figure 2. A diagram of the two positions used in cheetah training; radiograph training (left) and blood draw training (right). *(Image created by Marcelo Jorge using the computer program SketchUp. The cheetah was a premade model downloaded from the 3D Warehouse, made by Corinne G. and SketchUp, respectively.)*

in a cup. A clicker attached to the feeding tongs was used as a bridge. On average we fed 75% of her diet during training sessions and left the last 25% for shifting inside at night. On days that the cheetahs were given overnight access to their yards 100% of the daily diet would be used during training.

For this project we built an apparatus that would function as a physical barrier or wall to create a temporary corridor as well as a mount for the radiograph plate. To do this, we connected two 40x48 inches plywood boards at a 90-degree angle to create a corner. The apparatus was placed inside her yard in the corner of the exhibit so that it created a corridor with a 90-degree turn (Figure 2). The apparatus was made into a corner to allow for training versatility, but it also allowed her to easily exit by turning left instead of maneuvering her body awkwardly backwards. This was very useful because at the beginning of training she had some aversion to being near humans in a confined space. This easy exit option helped her to be more relaxed and trusting. The radiograph plate was placed in the wall mount, which was 2 ft. tall and 35 in. wide. The plate could only be inserted from the top and once in the mount there was a top lip and bottom lip to secure it in place. The wall mount was wider than necessary to fit the plate so that if needed we could move the plate further up or down the cheetah's body depending on which area we were trying to target. During training we constructed mock radiograph instruments to help desensitize the cheetah to their presence. The first piece we created was the radiograph plate, made from plywood cut in the same dimensions as the plate. The plywood was painted black on one side and white on the other side to simulate the actual plate when it had the black cover on and when the white plate was exposed. The second instrument we created was a radiograph machine replicate. We painted a shoebox bright yellow to resemble both the size and color of the actual machine (Figure 3). We also needed to cut a square out of the metal grate of the exhibit mesh to obtain a clean radiograph without the metal interference. We installed Plexiglas in the area to maintain a barrier between the cat and us. When we needed to use the window we could unlatch the grate, swing it up and lock it open. When we were finished we could swing the grate back down and latch it in place. Training took place during each step of construction, which helped Charo to acclimate to the novel stimuli one step at a time.

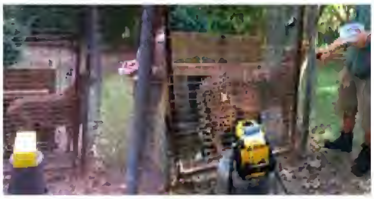

Figure 3. Cheetah Charo in position for a radiograph; mock instrument and supervisor Shauna Cannon (left) and the actual radiograph machine and keeper Marcelo Jorge (right). *Photos by Marcelo Jorge and Shauna Cannon*

We set up the apparatus with the mock plate in Charo's yard and placed enticing enrichment in the new corridor it created before letting Charo into the yard so that her first experience in the corridor was more likely to be a positive one. From there, we started to place part of her diet in the corridor so she would associate being in the corridor with being fed. Once she was comfortable entering the corridor on her own we began to bait her into position while the trainer stood next to her. After the initial acclimation process, we began introducing a clicker as a bridge. Training continued by having a second trainer present during the sessions; the second trainer made noise and moved around until Charo was comfortable with their presence. We then introduced the shoebox to simulate the radiograph machine. We later installed and introduced the Plexiglas and began to use the window. When construction was complete we began to incorporate the routine of raising the window and putting the shoebox in place then cueing Charo to enter the corridor with the second trainer joining the session after Charo had walked into position. Once the second trainer came in they would make minor adjustments to the shoebox as if it was the actual machine and then used a flashlight to mimic the radiograph light. Once Charo was consistently coming into position with all the mock instruments present and the second trainer by her side we began to incorporate a hold cue to ensure a higher probability of a clear picture when using the real machine. I used the blood popsicle to reinforce her continuously while she held her position. In the final stages of training, the secondary trainers were varied so she would be comfortable with different people being involved on any given day. Once Charo was reliably holding in place, our veterinary technicians joined our sessions with the actual radiograph machine. During these sessions we marked out the distance from the gate the radiograph machine would need to be placed in order to achieve images. Through this process we found that Charo had a slight inclination to mimic her trainer; if I sat down she would lay down sternal but if I stood she would stand the entire session. I planned to use this mimicry to our advantage since for the radiograph we would need her to stand throughout the session and for the blood draw we would need her to lay sternal. Once Charo had accomplished each phase of the radiograph training we decided to move on to the blood draw training.

For the blood draw training we began each session with Charo standing correctly in the position she would need to be in for a radiograph with the mock instruments present. This allowed us to maintain and even improve the behavior needed for a radiograph and allowed Charo to start with behaviors she was accustomed to before we began more complicated behaviors, which I believe helped us move through the steps faster during the blood draw training. Training for the blood draw in the same area she was trained for radiographs allowed her to gain confidence in the location and build on her training from one behavior to the next. When we began to work on the blood draw training we were immediately able to have the second trainer involved because of the preliminary work done during the radiograph training. We started by having Charo round the corner of the makeshift corridor and then lie down. I would then reward her until she was positioned with her hindquarters up against the gate and her body parallel to the fence. The corridor we created expedited this process of positioning. While positioning was initially established by baiting, once the behavior was completed we were able to add cues for standing and lying sternal. After the proper position was established the second trainer could gently guide her tail under the mesh using a metal snake hook. We then began to desensitize her tail to touch and manipulation by having the second trainer lightly touch her tail after counting to three

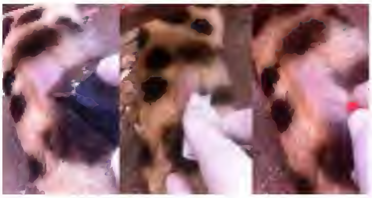

Figure 4. Cheetah Charo's tail outside of the fence and the progressions of blood draw training: shaving with clippers (left), scrubbing with alcohol (middle), and sticking with dull metal practice needle (right). *Photos by Marcelo Jorge*

while I reinforced her for remaining in place. After several weeks of tail manipulation Charo was comfortable with several different people manipulating her tail. Next we introduced hair clippers and the sound they make, the sensation of wet alcohol-soaked gauze on her bare tail, and the pressure of a blunt needle followed by a real needle. The clippers, alcohol scrubs and needle were placed one at a time against her tail on a count of three while saying "shave", "scrub" and "stick" respectively. The hair clippers were used first and we began by desensitizing her to the noise it made while on, then placing it against her tail to desensitize her to the vibration, then lightly shaving an area on the tail and finally fully shaving and increasing the size of the shave spot. Once this stage was complete we introduced the alcohol gauze and slowly increased duration and pressure while scrubbing the shaved area. Next we began to touch her tail with a blunt needle and then a real needle (without breaking the skin) and slowly increased duration and pressure for each (Figure 4). Once the routine was established we worked on increasing the length of time we held the needle in place on her tail to prepare her for the amount of time that the needle would be in her vein for blood collection. After these steps were accomplished we incorporated our veterinary technicians to desensitize Charo to them again. At the completion of training Charo would lie down in position, allow us to grasp her tail and move it under the mesh and into position, shave it, scrub it with alcohol until it was clean, and then position the needle for as much time as we needed, and she did this with no aversion or apprehension.

Results

On December 16, 2015 three radiographs of Charo were taken by our veterinary technician (Figure 5). The images showed clearly defined bones and some traces of the gastrointestinal tract with organic material inside it. These images would be clear enough to identify proper fetal position of prospective cubs and any bone fracture should either of those events occur. Charo continues to hold in place when cued suggesting that standing for radiographs was a positive experience.

On January 11, 2016, we collected 6 ml of blood from Charo's tail, only 42 days since we began training for blood draws (Figures 6 and 7). This was a great accomplishment for me as it was the first voluntary blood draw I have trained but it also marked the first time in the Fort Worth Zoo's history that a large feline has been trained for voluntary blood draws. Our veterinary team used this sample to run complete blood count and serum chemistry as well as sending some samples to our nutrition department for additional analyses. Because we were able to collect blood and can now begin a voluntary blood draw schedule, we are able to gain valuable information for our cheetah's healthcare. It has been shown that anesthesia can have an effect on an animal's cardiovascular (Kannah, 1989) and autonomic nervous system (Watkins, 1991). Voluntary blood collection is ideal because the blood is recovered under positive reinforcement and represents the most accurate picture of the cheetah's health versus taking blood from a stressed or anesthetized animal. One study found animals that voluntarily allowed an injection showed less physiological signs of stress (total white blood cell count, absolute segmented neutrophils, glucose levels, and hematocrit levels) than those who were involuntarily injected (Lambeth, 2006). Since Charo did not go through the stress of being darted with drugs that might alter her blood chemistry, the results of the blood from this sample likely depicted normal blood levels for her. Through future blood collection we will be able to evaluate her nutritional status by analyzing the fats, protein and vitamins in her blood and we can then make diet modifications if needed. As a result of our blood collection training we have opened up multiple ways to promote her health, and we can build on this training to facilitate other medical procedures such as injections.

Discussion and Conclusions

During this training Charo learned new behaviors and I also learned to focus my training on three main concepts: (1) the benefits of using a repetitive routine at consistent training times to help the animal learn the routine and aid in the learning process; (2) training a simple behavior first and then building up to more complex behaviors facilitates the learning process by building a strong foundation of trust and understanding; and (3) preconceived notions about training do not help us to create new ideas for behaviors to train.

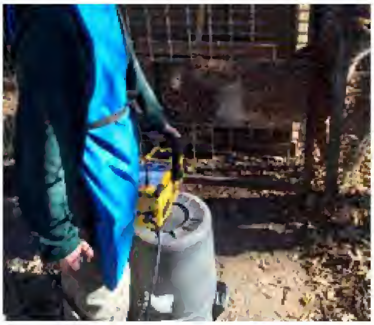

Figure 5. Veterinary technician Jackie Woods taking radiographs of cheetah Charo's hindquarters. *Photo by Shauna Cannon*

We found that what worked best for us and the cat was to make the sessions routine, so we trained at the same time every day and we progressed through the steps in the same format each day. By maintaining our routine we helped Charo build her confidence by being aware of the next step in the progression. We could see that she was learning the routine because if we were running late she would sit by the door where we prepared her diet or stand in position waiting. I did have some uncertainty about always using the same routine such as, would she still perform if we change the time of our training sessions or altered the order of the steps? These doubts were laid to rest when a veterinary camp of eight unfamiliar people observed a morning training session and her performance was comparable to the routine afternoon session.

Because Charo was not previously trained before starting this project, instead of going from no training to blood draws we wanted to add steps to build on so she could gain confidence, trust, and a positive introduction to training. This came in the form of training for radiographs because we needed her to stand steady in position without us manipulating her in any way. This step not only allowed Charo to gain confidence by being rewarded consistently and frequently but it also allowed her to feel safe in the corridor with us near her. By building on our training with her and progressing from body positioning for radiographs to blood draw training we feel we were able to complete the blood draw training in less time and with less stress than if she had no prior training. She was also able to experience positive reinforcement through the radiograph training, which was evident because sometimes she would offer behaviors to see if she could get rewarded!

The last concept, abandoning preconceptions, applies to the mentality of the trainer and their approach to training. I started this project thinking that we would only be training for blood draws using a physical barrier to create a corridor for training. But a change in my mindset allowed to me to take that barrier and turn it into a toolbox where we could perform multiple medical procedures. Once I abandoned the idea that the wall's function was to simply help me adjust the cat's position

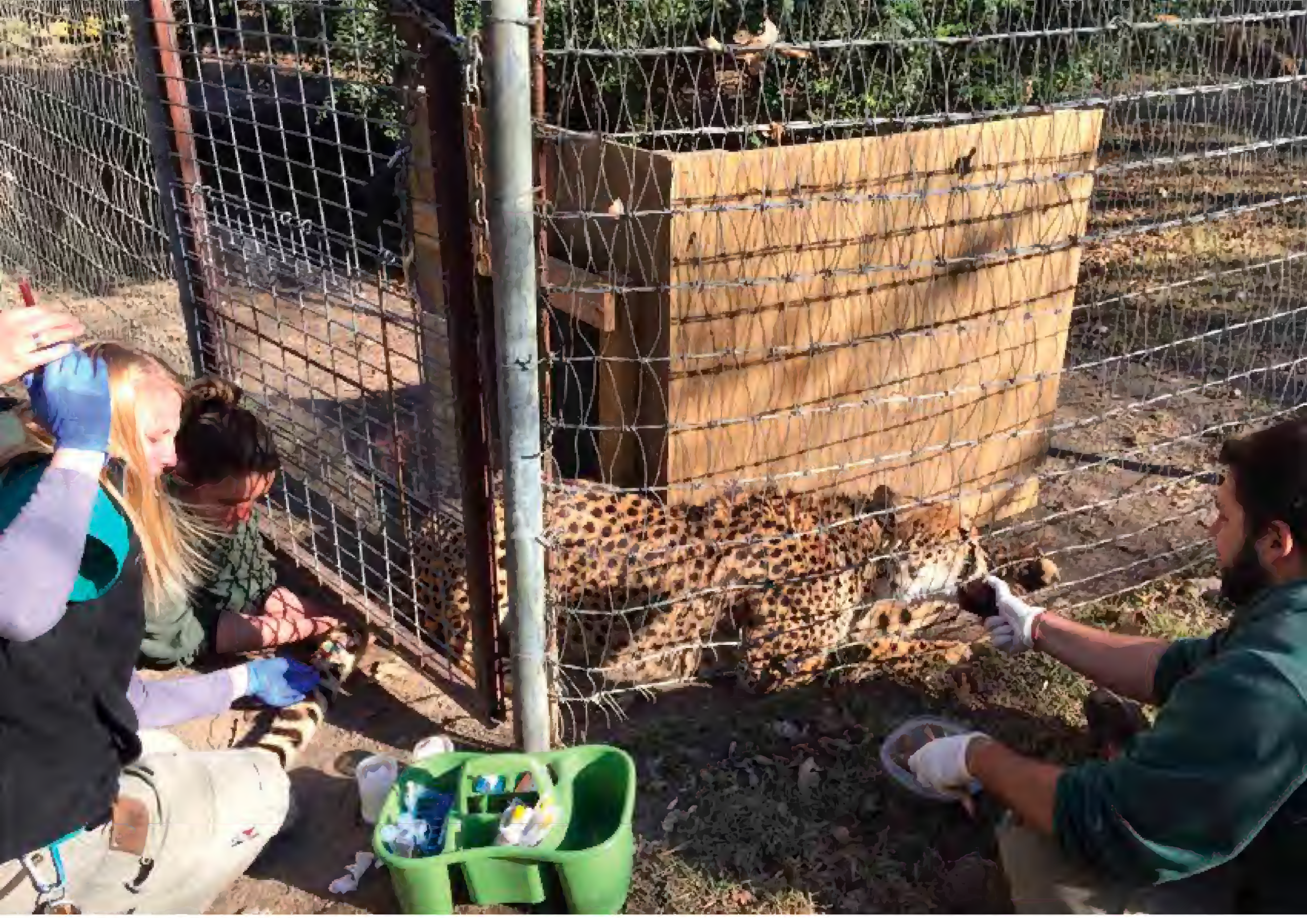

Figure 6. Cheetah Charo during blood collection; from left to right: veterinary technician Ashley Pich, supervisor Shauna Cannon and keeper Marcelo Jorge. *Photo by Stephanie Crowson*

I was able to get creative and find new ideas to build off of the training. Not only did we turn this area into a place to take radiographs and blood draws but it has also transformed into a prospective site for subcutaneous injections, intramuscular injections, visual inspections, claw trimmings, a pseudo squeeze cage, and other procedures that are restricted only by our imagination. I am not the first to use a system like this to take radiographs but the idea of getting creative when using training tools is one I want to reiterate. Because I abandoned the preconception of what a physical barrier should look like or what it should do, it allowed me to expand Charo's learned behaviors and expand her training program.

For future goals, I will continue to work with Charo so we can increase her repertoire of behaviors for medical procedures. We also started to work with our two males on voluntary blood draw training, which began soon after Charo's training. The males' training is interesting because even though I train them one at a time they can see each other so they have the opportunity to learn the behaviors from each other through observational learning. Using observational learning and a systematic routine, we were able to collect blood from both males 49 days after we began working with them. Through this training we were able to collect blood on three of our cheetahs as well as take radiographs of our female. Through these projects I have learned that we as keepers should continue to create new and ingenious ways to train behaviors because every animal is different and what works for some may not work for others. I hope that by sharing my project we can all grow together in this field.

Acknowledgements

I would like to thank everyone who was involved in this project from conception to construction and through to completion, as well as supporting roles. Specifically my supervisor, Shauna Cannon, projects staff, Eric Mcright, keepers Mark Eberly, Maggie West, Lindey Blackney, Shannon Kelly and Ellis Connor, mammal curators Kurt Giesler and Stephanie Crowson, veterinarians Dr. Nancy Lung and Dr. Carlos Sanchez, hospital supervisor Danielle O'Neil, veterinary technicians Ashley Pich, Dylan Quataert, and Jackie Woods, curator of conservation and behavior Dr. Jenny Elston, and the Fort Worth Zoo for supporting this project.

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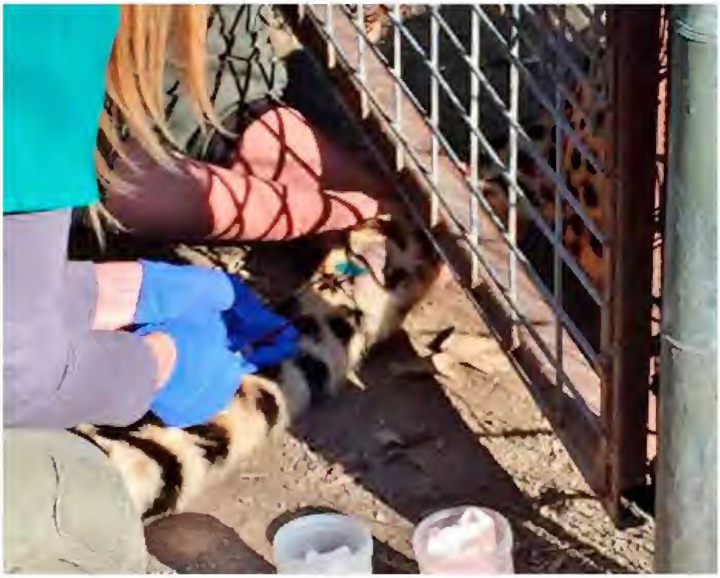

Figure 7. Blood collection from cheetah Charo's tail. *Photo by Stephanie Crowson*

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Editor's Comments by Beth Posta:

This Training Tale shows that a little creativity goes a long way. Training for medical behaviors, especially those that involve a needle, can be tricky at best. The training team did a great job planning out the many steps to desensitize the cheetah to the equipment and staffing needed for these two behaviors. The construction of a training corridor, combined with the desensitization work, was a creative– and positive way to convey to the cheetah where to go for training sessions and a rewarding experience.

The idea of starting with a less invasive behavior (radiographs) prior to training for blood collection was clever. By taking the time to establish the corridor and training overall as positive for this cheetah, the staff likely decreased the amount of time it took to train the blood collection behavior. It's creative thinking like this that makes our training programs that much stronger. It sounds like the staff at the Fort Worth Zoo has made great progress with their cheetah-training program. Nice work! I look forward to hearing more about this productive and successful program!

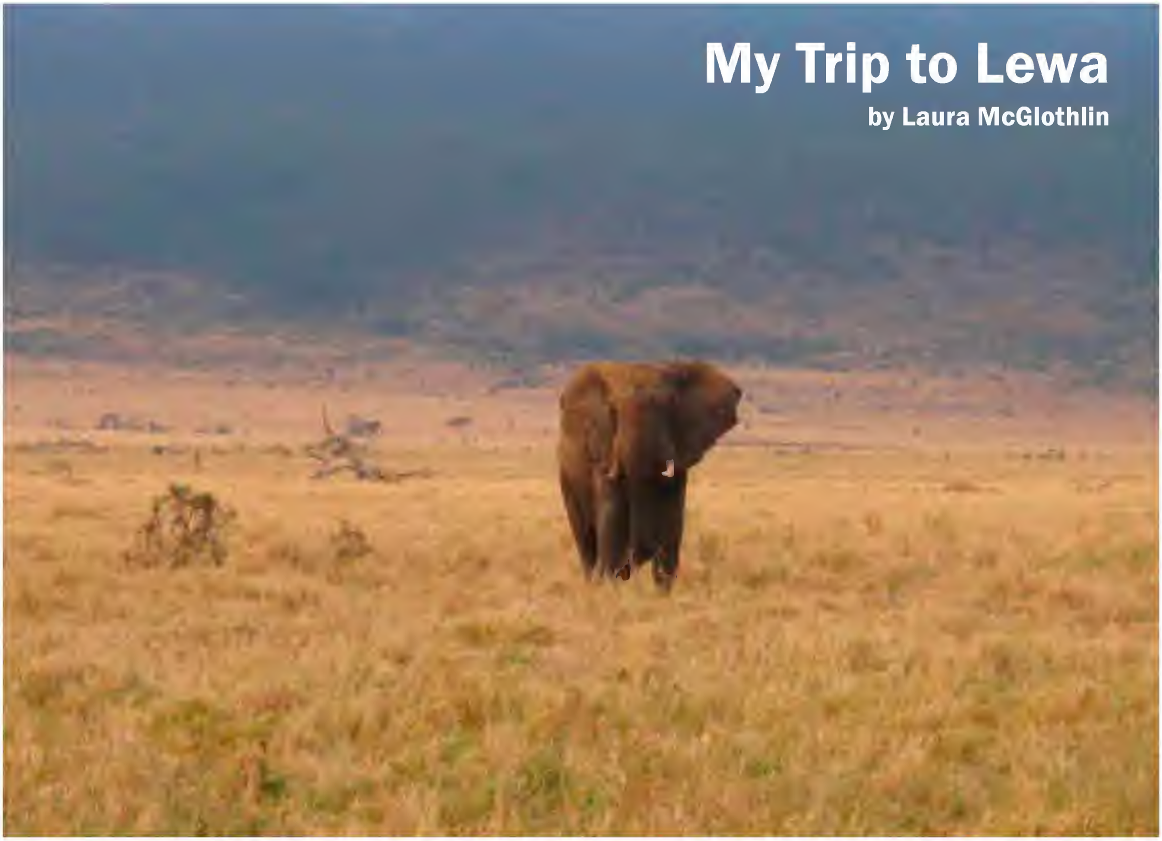
We want to hear your Training Tales – the good, the bad and the fabulous!

Please submit your "Training Tales" and experiences in operant conditioning to share with *Animal Keepers' Forum* readers. This opportunity provides a convenient outlet for you to exhibit your training challenges, methods and milestones with the AAZK member network. Please submit entries based on the following guidelines:

- Submit a brief description of a training project at your facility. These can be 500 words or less, in text or bullet points – it can be longer (up to 1000 words); however, short and simple descriptions with a few images are just as perfect. Details should include the following:
    - Define the training goal (what did you try to do and for what purpose?)
    - List important steps (How did you do it – include plans that changed along the way/ what worked and what didn't work)
    - Timeline used (how long did it take)
    - Tips you learned along the way
    - Include 3-5 digital photos that clearly depict the animal in the learning process or performing the desired goal (provide photo caption and photographer of each image). Photos need to be 300 dpi and at least 1200 x 1800 pixels.
- Please send submissions or questions to: Kim Kezer at kkezer@zoonewengland.com or Shane Good at shane.good@aazk.org. (Use Training Tales Submission as the subject)

My Trip to Lewa

by Laura McGlothlin



In May of 2014 we opened our newest exhibit at the Columbus Zoo and Aquarium, "Heart of Africa". According to Jack Hanna, we were able to capture the essence of the African savannah with the landscape and animals. I stood there gazing at the giraffes and lions in our "Africa" and, although it was beautiful, my heart was heavy because at that moment I realized that was as close to Africa as I was ever going to get, an actual trip to Africa was nowhere in my future. Oh, isn't life full of surprises! Not even 24 hours later, I sat and read an e-mail from Patty Pearthree with the subject "Honorary winner." Naturally I assumed she was just announcing to all who the Honorary BFR winner was. As I read the letter, however, tears began to well up in my eyes as I came to understand that I was the winner, and that I was going to get to go to the land I had dreamed of for over a decade, Lewa Wildlife Conservancy in Kenya.

When I was first hired in the Pachyderm Department of the Columbus Zoo and Aquarium I was infatuated with elephants, that was until I met the rhinos and I discovered my new favorite animal. My first order of business once hired was to hold a Bowling For Rhinos event; we hadn't had one in years and I was becoming increasingly more aware of the need for rhino conservation. My first event was in 2001 and I was just beginning to learn about what BFR funds provide to different regions of the world. I was fortunate to meet Anna Merz that year at the AAZK conference and receive a signed copy of her book, *Rhino at the Brink of Extinction*. It was then that I fell in love with the idea of going to Lewa and it became one of my favorite, although seemingly unattainable, dreams.

The news of the e-mail I received in May of 2014 actually took a few months to sink in, but once I started receiving e-mails from the travel agent arranging our trip, it all became very real. My husband and I had never travelled internationally together, and we both were a little anxious, especially about leaving our three young children at home. Patty was a valuable resource, without her I don't feel as though we would have been as prepared and I am sure we would have been much more anxious. Up until the moment our plane left from Columbus we exchanged e-mails with Patty covering every little detail that we could think of.

After a brief layover in Amsterdam, we arrived in Nairobi under night fall and quickly made it through customs and to our overnight accommodations. Although the smell of the air was different, the complete realization that we were in Africa did not come full force until the morning when we were able to see the trees and landscape. So many things were similar, but several were different. I took pictures of the trampoline and other toys that my own children enjoy, as well as the coffee pot that I had never seen one like in my life. After breakfast, we headed to the airport to board by far the tiniest plane I have ever been on. The flight was bumpy, but thankfully we did not fall from the sky like I felt that we might. We made it to the Lewa airstrip in a little over an hour. Words cannot describe the emotions I felt as we were met by Ruwaydah and Benjamin under the hot African sun. Ruwaydah was our host from Lewa, she was very personable and we immediately took a liking to her. Soon we were off to start our adventure. At this point I had still not seen any animals. I was too focused on landing safely to see them from the plane during our descent, although I heard the other five people on the plane exclaim over the elephants and other animals. Now being safely on the ground I was free to watch for the animals and just take in the beauty that surrounded us.

After all my years of dreaming of actually going to Kenya, I am pleased to say that Lewa surpassed my expectations. It was spectacular! We drove to the Ngiri house, where we would be staying during our time on Lewa. When we arrived at the house we were introduced to the staff and shown our accommodations for the week, an adorable cottage out by the pool. Although we were advised to go and rest since we must be jet lagged, it was our first day in Africa so of course we sat outside and took about 100 pictures of the first animals we saw. That first afternoon right from the chairs outside our room we saw a giraffe, a warthog, some antelope, and a herd of elephants! Our lunch was served outside, and we got to see the vervet monkeys in action. I had always heard that they were pesky little monkeys, and they were. As soon as the table was left unattended, they were on the table getting into the water pitcher and eating the fruit. We were warned to make sure we always shut the door to our room because the monkeys have been known to eat toothpaste, medications, you name it.

After lunch we went on our first game drive which, unbeknownst to me at the time, was also going to be a sundowner. On that first game drive we saw it all, or so it seemed; rhinos with calves, herds of elephants, and water buffalo, to name a few. We were fortunate to see a young white rhino calf romping in the grass by the road with his mom. Around 5:30, we parked at an overlook and got out of our vehicle, and just looked out for miles until the sun went down. Watching the sun set on Lewa was surreal, the perfect ending to our first day.

Our week was packed with opportunities to see many of the different areas of Lewa. My mind was blown! All these years of telling people where the money goes and giving a small description of what the money will provide, it turns out I had no idea how far it really went. The number of lives in the community that are affected by Lewa is amazing. Our first stop was at a medical clinic, one of four medical clinics that Lewa operates. They offer vaccines, family planning, pre-natal care, and much more. The medical clinics are able to provide care for over 50,000 people in the community. As I was walking around this facility, I was impressed with the cleanliness. This was not what I envisioned when picturing a medical clinic in the bush. I actually ended up getting a tetanus shot after stepping on a thorn and I had no concerns, whereas if you had told me prior to my trip that I would receive an injection while on safari in Africa, I probably would have been a little concerned.

The security on Lewa was extraordinary. We were able to meet members of the anti-poaching unit, including the dogs, and see the operations room where they keep track of everything. The dogs were well trained and we were treated to a demonstration where they tracked the “poacher” from a great distance, just using the scent from a footprint. The dedication of those that work in this unit was admirable. Our trip to the operations room where they keep track of the rhinos and work to ensure their safety, was rather enlightening as well. I was able to look at the list of every rhino on Lewa. They have someone find each rhino every day, and if they don’t see one after two days, on the third day they intensify the search until the animal is found. The guards risk their lives daily for the lives of the rhinos.

The education center and the school were some of my favorite places to visit. This was partially because they were amazing and partially because this mom was getting a little homesick for the sound of children’s voices. The education center was phenomenal. Children from Kenya that may have not had a chance to see the native wild animals, have the

Laura was a BFR Ho

opportunity to come to the center to go on a safari. In addition, they are taught about recycling, ecology, sustainability, and conservation. There is also a dorm for them to stay overnight, and the children help cook the food that they eat and clean the dorm in the morning. We also learned about the struggle that many face to get an education, especially the women. The opportunity for education that we receive in the U.S. is often taken for granted; I know that I never thought of myself as lucky to be able to attend school.

After seeing much of Lewa, we loaded ourselves and our luggage into a Land Rover and drove for a very bumpy hour to Il Ngwesi. It was outstanding! We were greeted by the Maasai singing. Afterward they carried our bags up the seemingly never-ending stairs. The rooms were built into the side of a mountain and had no outer walls; they just opened up right into the African savannah. Our room overlooked the watering hole, and we spent a majority of the next two days watching the animals come and go. When we first arrived in our room, a herd of elephants was sleeping under a tree, as we watched they all made their way over to the watering hole and stayed there for most of the afternoon. The joy that comes from watching a baby elephant play in a watering hole in Kenya is indescribable! We saw so many animals; hyenas, jackals, guineas, zebra, kudu, warthogs; all right from our balcony. It felt like we were the only people there. When it got dark, bats flew in by our bed, and we were able to sit and watch the stars for hours. All through that first night we could hear elephants rumble and move through the trees below. It was an unforgettable experience, and I imagine I will dream of going back there the rest of my life. On our last night at this magical place we went to a Maasai village and learned about their culture. The highlight for me was again the children, they were so curious; I spent half an hour looking through pictures on my camera with them.

The last few days at Lewa were bittersweet. We were still enjoying the beauty and serenity, but also missing our little ones back home. We spent those remaining game drives focused on finding lions, the one animal we had wanted to see but hadn't. There were several nights when we heard them roaring but by the time of our morning game drive they were once again hidden away. However, through the search for the elusive lions we got to see some pretty incredible sights and went to some new places on Lewa. On the last morning, we awoke to the sound of a lion roaring and my husband was able to spot a male lion through his binoculars. We went on a last minute game drive to get closer to the lion but once again it had moved away.

When people ask about our trip to Africa, they expect to hear about the animals we saw and different food that we ate. They get some of that, but what I share the most is how many people that Lewa Wildlife Conservancy helps. The money we raise for Bowling For Rhinos is not only protecting the rhinos and other animals, but it is helping the entire community. Animal lives are being protected and human lives are being changed.

I am so thankful to the AAZK Board of Directors for awarding me this trip. I am forever thankful to Patty Pearthree for all of her help and to Ruwaydah for making our trip to Africa exceed any expectations that I had. I cannot put into words my gratitude for Lewa, for their tremendous hospitality and for all the work that they do for conservation. I thought this would be a once in a lifetime trip but now I feel that I will forever be finding my way back to Lewa and striving to do more to raise money for Bowling For Rhinos. Thank you to the Columbus Zoo and Aquarium for first allowing me the opportunity to fall in love with rhinos, which is where this all began.

norary Trip Winner

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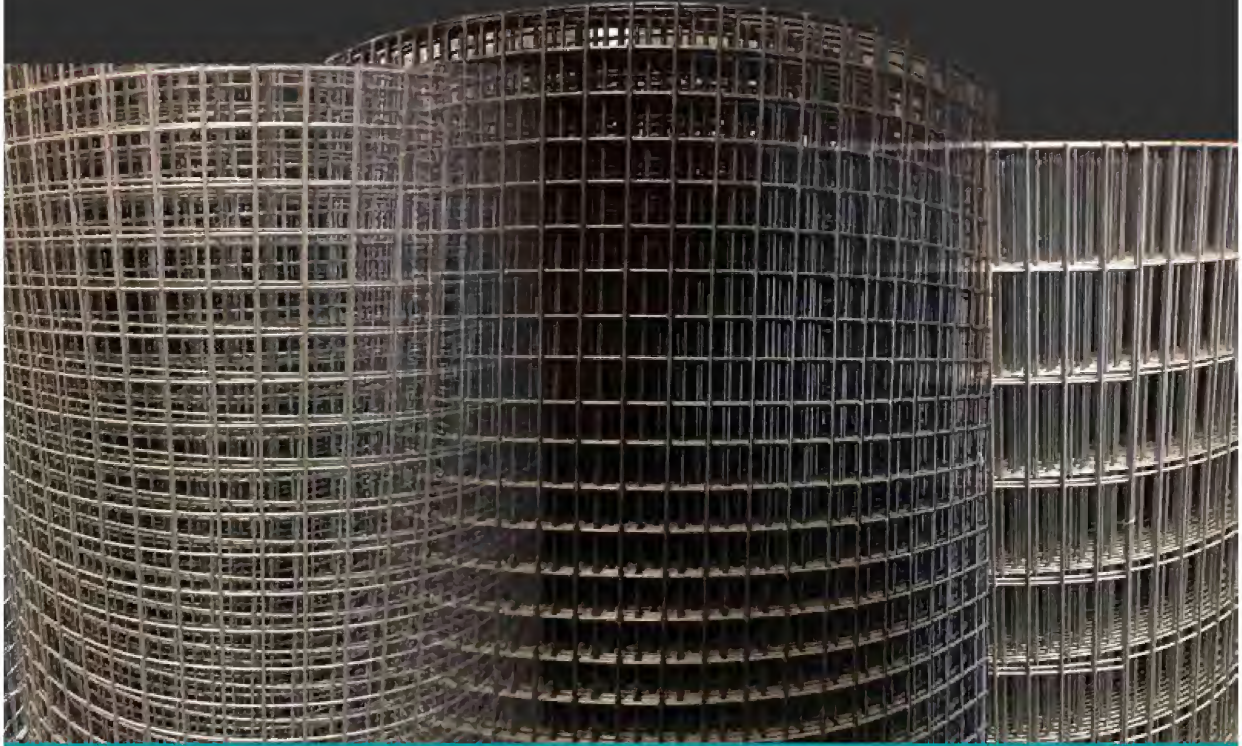

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